

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW
AIR CONTAMINANT SOURCE FOR
MICROSOFT CORPORATION
COLUMBIA DATA CENTER

PRELIMINARY DETERMINATION
Approval Number 14AQ-E553

TO: David Fierbaugh, Facility Contact
Microsoft Corporation
Columbia Data Center
501 Port Industrial Parkway
Quincy, WA 98848

EQUIPMENT

1. A list of equipment that was evaluated for this order of approval is contained in Tables 1.1 through 1.4.

Table 1.1: 2.5 eMW Engine & Generator Serial Numbers				
Phase	Unit ID	Engine SN	Generator SN	Build date
CO1/1	1	SBK000170	G4B00130	8/14/06
“	2	SBK000179	G4B00132	8/25/06
“	3	SBK000169	G4B00128	8/10/06
“	4	SBK000181	G4B00133	8/28/06
“	5	SBK000176	G4B00131	8/25/06
“	6	SBK000168	G4B00129	8/10/06
“	7	SBK000160	G4B00125	7/21/06
“	8	SBK000159	G4B00127	7/19/06
“	9	SBK000162	G4B00126	7/24/06
“	10	SBK000158	G4B00124	7/19/06
“	11	SBK000172	G4B00113	8/18/06
“	12	SBK00990	KHD00231	8/15/10
CO1/2	1	SBK000208	G4B00173	11/1/06
“	2	SBK000214	G4B00171	11/6/06
“	3	SBK000211	G4B00176	11/3/06
“	4	SBK000213	G4B00177	11/6/06
“	5	SBK000201	G4B00178	10/20/06
“	6	SBK000171	G4B00112	8/17/06
“	7	SBK000212	G4B00175	11/6/06
“	8	SBK000205	G4B00170	10/30/06
“	9	SBK000210	G4B00172	11/3/06
“	10	SBK000200	G4B00179	10/20/06
“	11	SBK000209	G4B00174	11/2/06
“	12	SBK00989	KHD00230	8/14/10
CO3.2	25	SBK00949	G8D00117	7/25/10
	26	SBK00947	G8D00116	7/16/10
	27	SBK00945	G8D00115	7/15/10

	28	SBK00953	G8D00119	7/28/10
	29	SBK00951	G8D00118	7/28/10
CO3.1	30	SBK01014	G8D00142	10/6/10
	31	SBK01012	G8D00141	10/5/10
	32	SBK01030	G8D00146	10/14/10
	33	SBK01027	G8D00145	10/13/10
CO3.3	34	SBK01013	G8D00140	9/30/10
	35	SBK01015	G8D00144	10/7/10
	36	Not purchased		
	37	Not purchased		

Table 1.2: Fire Pump Engine SN

Unit ID	Engine SN	Engine Size	Build Year
CO1	Pe6068t602182	149 bhp	2006
CO2	Pe6068t679482	149 bhp	2007
CO3.1, 3.2, 3.3	Not purchased	149 bhp	

Table 1.3: Cooling Water Pre-treatment Generator Engine SN

Unit ID	Engine SN	Engine Size	Build Year
CWPT.1	G5AO1427	398 bhp	2007

Table 1.4: Cooling Towers

Unit ID	# Cooling Tower Banks	# Cooling Tower Units per Bank	Total # Cooling Tower Units
CO1	1	18	18
CO2	1	18	18
Total	2	na	36

DETERMINATIONS

In relation to this project, the State of Washington Department of Ecology (Ecology), pursuant to Revised Code of Washington (RCW) 70.94.152, Washington Administrative Code (WAC) 173-460-040, and WAC 173-400-110, makes the following determinations:

1. The project, if constructed and operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC, and Chapter 173-460 WAC, and the operation thereof, at the location proposed, will not emit pollutants in concentrations that will endanger public health.
2. The proposed project, if constructed and operated as herein required, will provide all known, available, and reasonable methods of emission control.

THEREFORE, IT IS ORDERED that the project as described in the Notice of Construction application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS**1. ADMINISTRATIVE CONDITION**

- 1.1 Notice of Construction Approval Order No.13AQ-E497 is rescinded and replaced entirely with the issuance of this Order.
- 1.2 Mountain View Elementary School administrators shall be provided a maintenance testing schedule as contained in the permit, and Microsoft shall update the school whenever Ecology-approved changes occur in the maintenance testing schedule. As decided by the school administrators and Microsoft, an ongoing relationship between the school and Microsoft should be established.

2. EQUIPMENT RESTRICTIONS

- 2.1 The 37 Caterpillar Model 3516C 2.5 eMW engines used to power the electrical generators shall be certified by the manufacturer to meet 40 CFR 89 Tier II emission levels if manufactured before January 1, 2011. Any generator engine manufactured after January 1, 2011 shall meet 40 CFR 89 Tier IV Transitional emission levels or other specifications as required by the EPA at the time the engines are installed.
- 2.2 The only Caterpillar Model 3516C 2.5 eMW engines and electrical generating units approved for operation at the Columbia Data Center are those listed in Table 1.1 above
- 2.3 Manufacture and installation of the CO3.3 engine/generator sets identified in Table 1.1 shall take place by April 10, 2015. If the manufacture and installation of these engines has not been completed by April 10, 2015, a NOC application may be required prior to installation.
- 2.4 Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require Notice of Construction unless there is an emission rate increase from the replacement engines.
- 2.5 The twenty 2.5 eMW CO1 and CO2 engine-generator exhaust stack heights shall be greater than or equal to 38 feet above ground level and 8 feet above roof height. The four 2.5 eMW ground level CO1 and CO2 engine-generators exhaust stack heights shall be greater than or equal to 20 feet above ground level. The thirteen 2.5 eMW ground level CO3.1, CO3.2, and CO3.3 engine-generators exhaust stack heights shall be greater than or equal to 31 feet above ground level.

3. OPERATING LIMITATIONS

- 3.1 The fuel consumption at the Columbia Data Center facility shall be limited to a total of 439,493 gallons per year and 88,800 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total annual fuel consumption by the facility may be averaged over a three (3) year period using monthly rolling totals.
- 3.2 The 24 CO1 and CO2 generators shall be limited to 300,000 gallons per year and not operate more than 121 hours per year per engine at an average capacity of 53% of full standby capacity. Individual units may be operated at a higher load than 53% of full standby capacity as long as total generator fuel consumption remains below 300,000 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil and no emission limit is exceeded. Total annual fuel consumption by the 24 CO1

and CO2 generators may be averaged over a three (3) year period using monthly rolling totals.

- 3.3 The 13 CO3.1, CO3.2, and CO3.3 generators shall not operate more than 104 hours per year per engine at an average load of 53% of full standby capacity. Individual units may be operated at a higher load than 53% of full standby capacity as long as total generator fuel consumption from the 13 engines remains below 139,493 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil and no emission limit is exceeded. Total annual fuel consumption by the 13 CO3.1, CO3.2, and CO3.3 generators may be averaged over a three (3) year period using monthly rolling totals.
- 3.4 The limitation on the annual diesel fuel allocation for the 13 CO3.1, CO3.2, and CO3.3 generator engines does not become effective until Microsoft has completed acceptance testing of the engines and generators. However, all emission limits remain effective during the acceptance testing period.
- 3.5 Operation of the 13 CO3.1, CO3.2, and CO3.3 generators for required monthly maintenance and testing shall be limited to approximately one hour per month each at an average electric load of 10% of the standby rating.
- 3.6 Operation of the 13 CO3.1, CO3.2, and CO3.3 generators for electrical bypass shall be limited to approximately 44 hours per year each at an average electrical load of 40% of the standby rating. No more than two engines shall operate at the same time during any electrical bypass operation.
- 3.7 Each of the 37 generator engines require maintenance and testing for approximately one hour per month. To mitigate engine emission impacts, Microsoft Corporation will perform at least 80% of all maintenance testing from 7:00 AM until 5:00 PM on Monday through Wednesday with no more than 3 engines tested concurrently. Engine maintenance and testing may take place outside of these restrictions upon coordination by Microsoft with the other data centers in Quincy to minimize engine emission impacts to the community. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology. This schedule can be re-negotiated at any time as approved in writing by Ecology, and will not trigger revision or amendment of this Order.
- 3.8 CO1 and CO2 each have 1 bank of 6 cooling units with a total of 18 cooling towers each. Each individual unit shall have a mist eliminator that will maintain the maximum drift rate to no more than 0.0005 percent of the circulating water rate.
- 3.9 Operation of the 13 CO3 generators for power outage emergencies shall be limited to a maximum of 48 hours per engine per calendar year at a maximum average electrical load of 85%.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

- 4.1 MSN will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the thirty-seven 2.5 eMW engines will conform to 40 CFR 89 emission specifications throughout the life of each engine.

- 4.2 On or before December 1, 2016, Microsoft shall source test two CO1 or CO2 engines and one CO3 engine to show continuing compliance with the applicable 40 CFR Part 89 Tier II emission standards for particulate matter, NO_x, CO, and non-methane hydrocarbons (NMHC). The tests required by December 1, 2016 shall be repeated periodically at 60 month intervals from December 1, 2016. Each test shall be performed on different engines from those tested previous, until each Caterpillar 3516C engine at the data center has been tested. Microsoft shall notify Ecology at least 20 days prior to any test of the engine (s) selected for testing, and consider any guidance provided by Ecology on this decision. In the event that any source test shows non-compliance with any Tier II emission standard, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of the Columbia Data Center. Test reports shall be submitted to Ecology as provided in Condition 10 of the Approval Order.
- 4.3 The following procedure shall be used for each test required by Condition 4.2 unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test.
- 4.3.1 Periodic emissions testing should be combined with pre-scheduled maintenance testing and annual load bank testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumptions limits authorized by this Order may be allowed by Ecology upon request.
- 4.3.2 Testing shall be performed at each of the five load levels described in Table 2 of Appendix B to Subpart E of Part 89, and data shall be reduced to a single weighted average value using the weighting factors specified in Table 2. Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output and mechanical horsepower output.
- 4.3.3 Testing shall employ the following EPA reference methods from 40 CFR Part 60, Appendix A. For NO_x, use Method 7E. For CO, use Method 10. For NMHC, use Methods 25A and 18. For particulate matter, use Method 5. The F-factor method described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing. The fuel meter data, as measured according to Condition 4.4, shall be included in the test report, along with the emissions calculations.
- 4.3.4 Three test runs shall be conducted for each engine. Each run must last at least 60 minutes. Analyzer data shall be recorded at least once every minute during the test. Engine run time and engine mechanical horsepower output and fuel usage shall be recorded during each test run for each load and shall be included in the test report. In lieu of these requirements, Microsoft may propose a test protocol to Ecology for approval.
- 4.3.5 For the gaseous pollutants (NO_x, CO, and NMHC), Microsoft may propose using a portable emissions instrument analyzer for subsequent rounds of periodic source testing if all three engines tested by December 1, 2016 show compliance with each of the Tier II emission standards referenced in Condition 4.2. The use of an analyzer and the analyzer model shall be approved in writing by Ecology prior to

testing. The analyzer shall be calibrated using EPA Protocol 1 gases according to the procedures for drift and bias limits outlined in EPA Methods 7E and Method 10. Alternate calibration procedures may be approved in advance by Ecology.

- 4.4 Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.
- 4.5 Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by the engine during each operation.
- 4.6 On or before July 1, 2017, Microsoft shall submit to Ecology a protocol for a health risk assessment that analyzes the public health risk to Quincy residents from DEEP emissions in the Quincy area, including emissions from data center engines, highways, locomotives, and other source categories. Microsoft shall submit the completed health risk assessment to Ecology within 90 days of Ecology's approval of the risk assessment protocol. Ecology may extend this deadline for good cause. The study shall model the locations in the community that experience the highest exposure to DEEP emissions, estimate the health risks associated with that exposure, and apportion the health risks among contributing source categories. In preparing the study, Microsoft may collaborate with other owners of diesel engines in or near Quincy. Ecology shall review the assessment and take appropriate action based on the results.

5. EMISSION LIMITS

The thirty-seven 2.5 eMW engine-generators shall meet the follow emission rate limitations:

- 5.1 Each existing CO1 and CO2 engine shall not exceed NO_x plus NMOC emissions of 6.4 g/kW-hr.
- 5.2 Each new CO1, CO2, CO3.1, CO3.2, and CO3.3 engine shall not exceed NO_x emissions of 6.12 g/kW-hr if built before January 1, 2011. The NO_x emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.
- 5.3 Each new CO1, CO2, CO3.1, CO3.2, and CO3.3 engine shall not exceed VOC emissions of 0.28 g/kW-hr.
- 5.4 Each existing CO1 and CO2 engine shall not exceed CO emissions of 3.50 g/kW-hr.
- 5.5 Each new CO1, CO2, CO3.1, CO3.2, and CO3.3 engine shall not exceed CO emissions of 3.50 g/kW-hr if built before January 1, 2011. The CO emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.
- 5.6 Each existing CO1 and CO2 engine shall not exceed PM emissions of 0.20 g/kW-hr. All PM shall be considered diesel engine exhaust particulate.
- 5.7 Each new CO1, CO2, CO3.1, CO3.2, and CO3.3 engine shall not exceed PM emissions of 0.20 g/kW-hr if built before January 1, 2011. The PM emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.

- 5.8 The total amount of PM emissions from operating all 37 engines during each year shall not exceed 1.03 tons/yr. All PM emissions shall be considered diesel engine exhaust particulate (DEEP) emissions and all DEEP emissions shall be considered PM_{2.5} emissions.
- 5.9 Visual emissions from each diesel electric generator exhaust stack shall be no more than 5 percent, with the exception of a ten (10) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.
- 5.10 SO₂ emissions from each diesel electric generator exhaust stack shall not exceed 0.03 lbs/hr.

6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the MSN CDC facility equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, cooling towers, and associated equipment shall be included in the manual. The O&M manual shall be updated to reflect any modifications of the equipment or its operating procedures. Emissions that result from failure to follow the operating procedures contained in the O&M manual or manufacturer's operating instructions may be considered proof that the equipment was not properly installed, operated, and/or maintained. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

- 6.1 Manufacturer's testing and maintenance procedures that will ensure that each individual engine will conform to the EPA Tiered Emission Standards appropriate for that engine throughout the life of the engine.
- 6.2 Normal operating parameters and design specifications.
- 6.3 Operating maintenance schedule.

7. SUBMITTALS

All notifications, reports, and other submittals shall be sent to:

Washington State Department of Ecology
Air Quality Program
4601 N. Monroe Street
Spokane, WA 99205-1295

8. RECORDKEEPING

All records, Operations and Maintenance Manual, and procedures developed under this Order shall be organized in a readily accessible manner and cover a minimum of the most recent 60-month period. The following records are required to be collected and maintained.

- 8.1 Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.
- 8.2 Annual hours of operation for each diesel engine.
- 8.3 Annual number of start-ups for each diesel engine.
- 8.4 Annual gross power generated by facility-wide operation of the emergency backup electrical generators.

- 8.5 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.
- 8.6 Recordkeeping required by 40 CFR Part 60 Subpart IIII.
- 8.7 Air quality complaints received from the public or other entity, and the affected emissions units.

9. REPORTING

- 9.1 Within 10 business days after entering into a binding agreement to purchase the engine/generator sets identified in Equipment Table 1.1 above, Microsoft Corporation shall notify Ecology in writing. The serial number of the engine and the generator, and the engine build date will be submitted prior to installation of each engine.
- 9.2 The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year.
 - 9.2.1 Monthly rolling annual total summary of air contaminant emissions, monthly rolling hours of operation with annual total, and monthly rolling gross power generation with annual total.
 - 9.2.2 Written notification that the O&M manual has been developed and updated within 60 days after the issuance of this Order.
- 9.3 Any air quality complaints resulting from operation of the emissions units or activities shall be promptly assessed and addressed. A record shall be maintained of Microsoft Corporation's action to investigate the validity of the complaint and what, if any, corrective action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

10. STACK TESTING

Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations shall be conducted as follows:

- 10.1 At least 30 days in advance of such testing, the Permittee shall submit a testing protocol for Ecology approval that includes the following information:
 - 10.1.1 The location and Unit ID of the equipment proposed to be tested.
 - 10.1.2 The operating parameters to be monitored during the test and the personnel assigned to monitor the parameters during the test.
 - 10.1.3 A description of the source including manufacturer, model number and design capacity of the equipment, and the location of the sample ports or test locations.
 - 10.1.4 Time and date of the test and identification and qualifications of the personnel involved.
 - 10.1.5 A description of the test methods or procedures to be used.
- 10.2 Test Reporting: test reports shall be submitted to Ecology within 45 days of completion of the test and shall include, at a minimum, the following information:
 - 10.2.1 A description of the source including manufacturer, model number and design capacity of the equipment, and the location of the sample ports or test locations.
 - 10.2.2 Time and date of the test and identification and qualifications of the personnel involved.

- 10.2.3 A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.
- 10.2.4 A summary of control system or equipment operating conditions.
- 10.2.5 A summary of production related parameters.
- 10.2.6 A description of the test methods or procedures used including all field data, quality assurance/quality control procedures and documentation.
- 10.2.7 A description of the analytical procedures used including all laboratory data, quality assurance/quality control procedures and documentation.
- 10.2.8 Copies of field data and example calculations.
- 10.2.9 Chain of custody information.
- 10.2.10 Calibration documentation.
- 10.2.11 Discussion of any abnormalities associated with the results.
- 10.2.12 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

11. GENERAL CONDITIONS

- 11.1 **Commencing/Discontinuing Construction and/or Operations:** This approval shall become void if the construction or operation of backup emergency diesel electric generation is discontinued at the facility for a period of eighteen (18) months, unless prior written notification is received by Ecology at the address in Condition 7 above.
- 11.2 **Compliance Assurance Access:** Access to the source by representatives of Ecology or the EPA shall be permitted upon request. Failure to allow such access is grounds for enforcement action under the federal Clean Air Act or the Washington State Clean Air Act, and may result in revocation of this Approval Order.
- 11.3 **Availability of Order and O&M Manual:** Legible copies of this Order and the O&M manual shall be available to employees in direct operation of the emergency diesel electric generators, and be available for review upon request by Ecology.
- 11.4 **Equipment Operation:** Operation of the Caterpillar Model 3516C units and related equipment shall be conducted in compliance with all data and specifications submitted as part of the NOC application and in accordance with the O&M manual, unless otherwise approved in writing by Ecology.
- 11.5 **Modifications:** Any modification to the generators, engines, or cooling towers and their related equipment's operating or maintenance procedures, contrary to information in the NOC application, shall be reported to Ecology at least 60 days before such modification. Such modification may require a new or amended NOC Approval Order.
- 11.6 **Activities Inconsistent with the NOC Application and this Approval Order:** Any activity undertaken by the permittee or others, in a manner that is inconsistent with the NOC application and this determination, shall be subject to Ecology enforcement under applicable regulations.
- 11.7 **Obligations under Other Laws or Regulations:** Nothing in this Approval Order shall be construed to relieve the permittee of its obligations under any local, state or federal laws or regulations.
- 11.8 **Fees:** Per WAC 173-455-120, this Approval Order and related regulatory requirements have a fee associated for review and issuance. This Order is effective upon Ecology's receipt of the fee, for which Ecology's fiscal office will provide a billing statement.

All plans, specifications, and other information submitted to the Department of Ecology relative to this project and further documents and any authorizations or approvals or denials in relation thereto shall be kept at the Eastern Regional Office of the Department of Ecology in the "Air Quality Controlled Sources" files, and by such action shall be incorporated herein and made a part thereof.

Authorization may be modified, suspended or revoked in whole or part for cause including, but not limited to the following:

1. Violation of any terms or conditions of this authorization;
2. Obtaining this authorization by misrepresentation or failure to disclose fully all relevant fact.

The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, and the reminder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Approval Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this Approval Order:

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website:

<http://www.eho.wa.gov>

To find laws and agency rules visit the Washington State Legislature Website:

<http://www1.leg.wa.gov/CodeReviser>

DATED this th day of July, 2014, at Spokane, Washington.

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